

TRAINING PROGRAM OF INSTRUCTION (TPI)
FOR
AFIS-EFC
ELECTRONIC FUNDAMENTALS COURSE



Approved by:

//Signed//

Hiram Bell, Jr.
COL. Commandant
Defense Information School

Approval Date:
2 Jan 2002
Supercedes TPI Dated: June 1999



ELECTRONIC FUNDAMENTALS
TRAINING PROGRAM OF INSTRUCTION

Table of Contents

<u>Element</u>	<u>Page</u>
Preface	4
FUNCTIONAL AREA 1 – Direct Current Fundamentals	6
Introduction to Electricity	
Direct Current Fundamentals	
Multimeter Measurements	
Basic DC Circuits	
Complex Circuits	
FUNCTIONAL AREA 2 – Alternating Current Fundamentals	11
Introduction to Alternating Currents (AC)	
AC Test Equipment	
Inductors and Resistance-Inductive (RL) Circuits	
Capacitors and Capacitive (RC) Circuits	
Resonance	
FUNCTIONAL AREA 3 – Basic Solid State Fundamentals and Special Components	16
Transformers	
Relays and Solenoids	
Diodes	
Transistors	
Power Supplies	
FUNCTIONAL AREA 4 – Basic Transistor Amplifiers and Operational Amplifiers Circuits	21
Transistor Amplifier	
Multi-stage Transistor Amplifiers	
Operational Amplifier	
FUNCTIONAL AREA 5 – Advanced Solid State Fundamentals	24
Transistor Oscillators	
Multivibrator Circuits	
Trigger Devices	

FUNCTIONAL AREA 6 – Basic Digital Principles	27
Digital Electronics	
Logic Functions	
Combinational Circuits	
Flip-Flop Circuits	
FUNCTIONAL AREA 7 – Advanced Digital Principles	31
Register Memory Circuits	
Arithmetic Counting Circuits	
Conversion and Data Circuits	
Microprocessor Circuits	
FUNCTIONAL AREA 8 – Soldering	35
FUNCTIONAL AREA 9 – Administration	36
Course Administration	

TRAINING PROGRAM OF INSTRUCTION

Preface

TRAINING PROGRAM OF INSTRUCTION FILE NUMBER (TPFN): AFIS-EFC

TITLE: Electronic Fundamentals Course

TRAINING LOCATION: Defense Information School, Ft. George G. Meade, Maryland

SPECIALITY AWARDED: None

PURPOSE: This course provides the common core prerequisite electronics fundamental training for students entering Army MOS 25R and must be completed in preparation for the Basic Television Equipment Maintenance Course (AFIS-BTVEM).

COURSE DESCRIPTION: The Electronic Fundamentals Course scope of training includes: direct current fundamentals, alternating current fundamentals, basic solid state fundamentals, advanced solid state fundamentals, basic transistor amplifiers and operational amplifiers, basic and advanced digital principles, and basic soldering.

PREREQUISITES:

SERVICE

USA

REQUIREMENTS

E1- E6: EL score of 110. Normal color vision.

A physical demand rating of moderately heavy; lift 75 pounds.

Profile series: PULHES 212221.

Cannot be acrophobic, claustrophobic, or have vertigo.

INTERNATIONAL

Security clearance. EL score of 80 or higher

CLASS SIZE:

MAXIMUM: 8

MINIMUM: 4

ANNUAL COURSE CAPACITY: 72

COURSE LENGTH: 48 TRAINING DAYS

ACADEMIC HOURS: 382.5

ADMINISTRATIVE HOURS: 1.5

TOTAL COURSE HOURS: 384

INSTRUCTOR CONTACT HOURS: 534.25

TYPE/METHOD OF INSTRUCTION: **HOURS:**

ADMINISTRATIVE (AD):	1.5
COMPUTER AIDED INSTRUCTION (CAI):	207.5
COMPUTER AIDED INSTRUCTION WITH PERFORMANCE EXERCISE (CAI/PE):	132.75
LECTURE (L):	7
DEMONSTRATION (D):	2
PERFORMANCE EXERCISE (PE):	14.5
WRITTEN EXAMINATION (EW):	17.75
PERFORMANCE EXAMINATION (EP)	1

TRAINING START DATE: January 2002

ENVIRONMENTAL IMPACT: None. DoD policy was followed to assess the environmental impact.

MANPOWER: The Interservice Training Review Organization (ITRO) formula was used to determine the number of instructors required.

EQUIPMENT AND FACILITIES: The Course Design Resource Estimate (CDRE) contains this information.

TRAINING DEVELOPMENT PROPONENT: Defense Information School, Course and Faculty Development Division, (301) 677-3273; DSN 622-3273

FUNCTIONAL AREA 1
DIRECT CURRENT FUNDAMENTALS

TPFN: AFIS-EFC-001-001-

UNIT TITLE: Introduction to Electricity

TPFN HOURS AND TYPE: 1 L; 3.25 CAI, .75 EW

TPFN TOTAL HOURS: 5

PREREQUISITE TPFN: None

TASK(s): 001 Introduction to Computer Aided Instruction (CAI)
002 Identify functions of equipment used in electronics.
003 Identify and comply with electronic safety

SUMMARY OF INSTRUCTION: Using the NIDA Computer Aided Instruction (CAI) program, students learn basics of electricity. Students are introduced to the CAI program, the CAI computer, experiment trainer and experiment cards. They review safety rules and factors involved with electronics. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program

NIDA Text Manual for DC Circuits

AFIS-EFC-4 Electronics Formula Handout

AFIS-EFC-6 High Voltage Safety Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (L, CAI, EW)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 1
DIRECT CURRENT FUNDAMENTALS

TPFN: AFIS-EFC-001-002-

UNIT TITLE: Direct Current Fundamentals

TPFN HOURS AND TYPE: 13 CAI; 2 CAI/PE; 1 EW

TPFN TOTAL HOURS: 16

PREREQUISITE TPFN: AFIS-EFC-001-001

TASK(s):

- 001 Perform conversions using metric notation and electrical prefixes.
- 002 Perform math operations using powers of ten (scientific notation).
- 003 Identify statements concerning the basic facts and principles of voltage and current.
- 004 Identify resistor operating principles.
- 005 Use resistor color code chart to determine facts about resistors.
- 006 Isolate a faulty resistor.
- 007 Identify basic facts and principles of switches, fuses and breakers.

SUMMARY OF INSTRUCTION:

Using the NIDA Computer Aided Instruction (CAI) program, students review the Base 10 Numbering System, powers of ten, metric notation, and metric prefixes to include math operations. Students are introduced to the basics of voltage and current, the electric circuit, resistors, switches, fuses, and circuit breakers. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program
NIDA Text Manual for DC Circuits
AFIS-EFC-4 Electronics Formula Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (CAI, EW) 2:8 (CAI/PE)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 1
DIRECT CURRENT FUNDAMENTALS

TPFN: AFIS-EFC-001-003-

UNIT TITLE: Multimeter Measurements

TPFN HOURS AND TYPE: 3.25 CAI; 12 CAI/PE; .75 EW

TPFN TOTAL HOURS: 16

PREREQUISITE TPFN: AFIS-EFC-001-002-

TASK(s):

- 001 Identify meter movement operating principles.
- 002 Identify statements concerning the basic facts and principles of multi-meters.
- 003 Perform voltage measurements with an analog multimeter.
- 004 Perform current measurements with an analog multimeter.
- 005 Perform resistance measurements with an analog multimeter.
- 006 Perform voltage measurements with a digital multimeter.
- 007 Perform current measurements with a digital multimeter.
- 008 Perform resistance measurements with a digital multimeter.
- 009 Perform a continuity check using a multimeter.

SUMMARY OF INSTRUCTION: Using the NIDA CAI program, students identify statements concerning the basic facts and principles of meter movements such as magnetism, electromagnetism, and electromagnet uses. Students are introduced to multimeter principles. Students describe five functional sections and various types of multimeters. Safety precautions are reviewed before setting up the multimeter and performing voltage, current, resistance and continuity measurements. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program

NIDA Text Manual for DC Circuits

AFIS-EFC-4 Electronics Formula Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (CAI, EW) 2:8 (CAI/PE)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 1
DIRECT CURRENT FUNDAMENTALS

TPFN: AFIS-EFC-001-004-

UNIT TITLE: Basic DC Circuits

TPFN HOURS AND TYPE: 10 CAI; 11.5 CAI/PE; .5 EW

TPFN TOTAL HOURS: 22

PREREQUISITE TPFN: AFIS-EFC-001-003-

TASK(s):

- 001 Identify DC characteristics.
- 002 Calculate unknown values in series DC circuits.
- 003 Troubleshoot a series DC circuit.
- 004 Calculate unknown values in a parallel DC circuit.
- 005 Troubleshoot a parallel DC circuit.
- 006 Calculate unknown values in a series-parallel DC circuit.
- 007 Troubleshoot a series-parallel DC circuit.

SUMMARY OF INSTRUCTION: Using the NIDA CAI program, students are introduced to direct current (DC) characteristics and electrical formulas including Ohm's law and the power wheel. Students then identify, calculate, and measure current, voltage, resistance, wattage, and troubleshoot series, parallel, and series-parallel DC circuits. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program
NIDA Text Manual for DC Circuits
AFIS-EFC-4 Electronics Formula Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (CAI, EW) 2:8 (CAI/PE)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 1
DIRECT CURRENT FUNDAMENTALS

TPFN: AFIS-EFC-001-005-

UNIT TITLE: Complex Circuits

TPFN HOURS AND TYPE: 6.5 CAI; 1 EW

TPFN TOTAL HOURS: 7.5

PREREQUISITE TPFN: AFIS-EFC-001-004-

TASK(s):

- 001 Identify basic facts and principles of voltage dividers.
- 002 Identify basic facts and principles of complex DC circuits.
- 003 Identify facts and principles of bridge circuits.
- 004 Identify the effects of voltmeter loading.

SUMMARY OF INSTRUCTION: Using the NIDA CAI program, students identify a voltage divider circuit. Students calculate and measure voltage, current, resistance, and the percent of regulation for loaded and unloaded voltage divider circuits. Students identify facts and principles of complex DC circuits, including Kirchoff's current and voltage laws. The circuit loading effect of multimeters and how multimeter loading is reduced is described. After describing the ohm per volt rating of analog multimeters, students measure circuit voltages using both analog and digital multimeter while observing the loading effect on the analog meter. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program
NIDA Text Manual for DC Circuits
AFIS-EFC-4 Electronics Formula Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (CAI, EW)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 2
ALTERNATING CURRENT FUNDAMENTALS

TPFN: AFIS-EFC-002-001-

UNIT TITLE: Introduction to Alternating Currents (AC)

TPFN HOURS AND TYPE: 8.75 CAI; .25 EW

TPFN TOTAL HOURS: 9

PREREQUISITE TPFN: AFIS-EFC-001-

TASK(s): 001 Identify statements concerning AC characteristics.
002 Calculate values in AC circuits.

SUMMARY OF INSTRUCTION: Using the NIDA CAI program, students identify statements concerning the characteristics of alternating currents. Students identify AC sinusoidal and non-sinusoidal waves, frequency, cycle, and hertz. Students define the characteristics of induction and determine the magnitude and polarity that voltage produces in a magnetic field. The operation of AC generators is explained, and students identify values of voltage and current at various electrical degrees. Students identify sine waves and calculate its wavelength and period. Students calculate peak, peak-to-peak, average, and RMS values. Students identify the in-phase and out-of-phase waveforms, magnitude and degree of an AC waveform using vectors. Students use Ohm's law to determine resistance in series, parallel, and series-parallel AC circuits. During this process the student also identifies the relationships between voltage, current, and resistance in these circuits. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program

NIDA Text Manual for AC Circuits

AFIS-EFC-4 Electronics Formula Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (CAI, EW)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA
ALTERNATING CURRENT FUNDAMENTALS

TPFN: AFIS-EFC-002-002-

UNIT TITLE: AC Test Equipment

TPFN HOURS AND TYPE: 9.75 CAI/PE; .25 EW

TPFN TOTAL HOURS: 10

PREREQUISITE TPFN: AFIS-EFC-002-001-

TASK(s):

- 001 Identify operation of an oscilloscope.
- 002 Use a frequency generator to provide signals.
- 003 Use a frequency counter to measure frequency.
- 004 Perform voltage, frequency and period measurements of selected waveforms.
- 005 Perform frequency and period measurements of selected AC signals.

SUMMARY OF INSTRUCTION: Using the NIDA CAI program, students are introduced to the oscilloscope, frequency (function) generator, and frequency counter. Students identify the purpose, quantities measured and different types of oscilloscopes. The four major functional sections of an oscilloscope are identified, and the purpose of each control and switch is described. Students learn the purpose, and signals created by a function generator. Students identify the controls of the function generator and describe their purpose before generating selected AC signals. Students use the oscilloscope to perform voltage, frequency, and period measurements of selected waveforms. Students identify the purpose and controls of the frequency counter before performing frequency and period measurements of selected AC signals. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program
NIDA Text Manual for AC Circuits
AFIS-EFC-4 Electronics Formula Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (EW) 2:8 (CAI/PE)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 2
ALTERNATING CURRENT FUNDAMENTALS

TPFN: AFIS-EFC-002-003-

UNIT TITLE: Inductance and Resistance-Inductive (RL) Circuits

TPFN HOURS AND TYPE: 5.5 CAI; 9.25 CAI/PE; .25 EW

TPFN TOTAL HOURS: 15

PREREQUISITE TPFN: AFIS-EFC-002-002-

TASK(s):

- 001 Identify inductor operating principles.
- 002 Isolate a faulty inductor.
- 003 Calculate inductor circuit values in a series circuit.
- 004 Calculate inductor circuit values in a parallel circuit.
- 005 Verify an RL circuit's operation and calculate the inductance and inductive reactance.
- 006 Troubleshoot an inductive circuit.

SUMMARY OF INSTRUCTION: Using the NIDA CAI program, students identify types of inductors and describe their current opposing characteristics. Students identify inductance and its unit of measurement. Building on this information, students calculate total inductance, total inductive reactance, and total impedance in a RL circuit. They verify the normal operation of an RL circuit and measure the phase relationship between the voltages developed across resistors and inductors. Students troubleshoot inductive circuits, to include open, shorted and changed value components in the circuits. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program

NIDA Text Manual for AC Circuits

AFIS-EFC-4 Electronics Formula Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (CAI, EW) 2:8 (CAI/PE)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 2
ALTERNATING CURRENT FUNDAMENTALS

TPFN: AFIS-EFC-002-004-

UNIT TITLE: Capacitance and Capacitive (RC) Circuits

TPFN HOURS AND TYPE: 16.5 CAI; 11 CAI/PE; .5 EW

TPFN TOTAL HOURS: 28

PREREQUISITE TPFN: AFIS-EFC-002-003-

TASK(s):

- 001 Identify capacitor operating principles.
- 002 Isolate a faulty capacitor.
- 003 Calculate capacitor circuit values in a series circuit.
- 004 Calculate capacitor circuit values in a parallel circuit.
- 005 Use capacitor color code chart to determine facts about capacitor.
- 006 Verify an RC circuit's operation and calculate the capacitance and capacitive reactance.
- 007 Troubleshoot a capacitive circuit.
- 008 Identify filter circuit.

SUMMARY OF INSTRUCTION: Using the NIDA CAI program, students identify types, schematic symbols, and describe charge and discharge characteristics for a capacitor. Students identify characteristics and the unit of measurement for capacitance. Students must identify ceramic, film, mica, electrolytic capacitors, and reading capacitance and voltage values. Students then verify normal operation of series and parallel RC circuits, calculating total capacitance, total capacitive reactance and total impedance of each. Students troubleshoot series and parallel RC circuits, identifying open, shorted, and changed value components in each. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program

NIDA Text Manual for AC Circuits

AFIS-EFC-4 Electronics Formula Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (CAI, EW) 2:8 (CAI/PE)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 2
ALTERNATING CURRENT FUNDAMENTALS

TPFN: AFIS-EFC-002-005-

UNIT TITLE: Resonance

TPFN HOURS AND TYPE: 8 CAI; 3.5 CAI/PE; .5 EW

TPFN TOTAL HOURS: 12

PREREQUISITE TPFN: AFIS-EFC-002-004-

TASK(s):

- 001 Identify basic facts and principles of wave shaping circuits.
- 002 Identify resistive-capacitive-inductive (RCL resonant circuit operating principles).
- 003 Calculate values in RCL circuits.
- 004 Troubleshoot RCL circuit.

SUMMARY OF INSTRUCTION: Using the NIDA CAI program, students receive an introduction to the basic facts and principles of filter circuits. Students receive an introduction to the basic facts and principles of wave shaping circuits, to include RC time constants operations. Using a multimeter and oscilloscope, students observe a capacitor charging and discharging. They also verify RC time constants using measurements. Students perform RC circuit transient experiments, predicting the effects and measuring voltage and current waveforms across a capacitor. They must identify typical faults in RC transient circuit, and troubleshooting procedures used to correct them before actually troubleshooting a basic wave shaping circuit. Students are introduced to the basic facts and principles of series, parallel, and resonant RCL circuits. The operations of these circuits are reviewed and unknown circuit values calculated. This unit concludes with students troubleshooting open, shorted, and changed value components in a RCL circuit. This unit concludes with a thirty-minute progress check, which students must pass with a minimum score of 72 percent before beginning the next unit. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program
NIDA Text Manual for AC Circuits
AFIS-EFC-4 Electronics Formula Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (CAI, .5 EW) 2:8 (CAI/PE)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 3
BASIC SOLID STATE FUNDAMENTALS AND SPECIAL COMPONENTS

TPFN: AFIS-EFC-003-001-

UNIT TITLE: Transformers

TPFN HOURS AND TYPE: 1.5 CAI; 3.25 CAI/PE; .25 EW

TPFN TOTAL HOURS: 5

PREREQUISITE TPFN: AFIS-EFC-002-

TASK(s):

- 001 Identify transformer operating principles.
- 002 Isolate a faulty transformer.
- 003 Calculate transformer circuit values.
- 004 Troubleshoot a transformer circuit.

SUMMARY OF INSTRUCTION: Using the NIDA CAI program, students are introduced to transformers. Students identify purpose, schematic symbols, reference designations, and operating characteristics. Students calculate turns ratio, primary, secondary voltage, current and power. Students experiment with transformer circuit operations measuring primary and secondary voltage of a transformer. Students review typical faults in transformer circuits, describing transformer troubleshooting procedures, and then troubleshoot a transformer circuit. This unit concludes with a thirty-minute progress check, which students must pass with a minimum score of 72 percent before beginning the next unit. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program

NIDA Text Manual for AC Circuits

AFIS-EFC-4 Electronics Formula Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (L, CAI) 2:8 (CAI/PE)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 3
BASIC SOLID STATE FUNDAMENTALS AND SPECIAL COMPONENTS

TPFN: AFIS-EFC-003-002-

UNIT TITLE: Relays and Solenoids

TPFN HOURS AND TYPE: 3.25 CAI; 4 CAI/PE; .75 EW

TPFN TOTAL HOURS: 8

PREREQUISITE TPFN: AFIS-EFC-003-001-

TASK(s): 001 Identify basic facts and principles of relays and solenoids.
002 Troubleshoot a relay circuit.
003 Troubleshoot a solenoid.
004 Identify basic facts of tracing signals in electrical circuits.

SUMMARY OF INSTRUCTION: Using the NIDA CAI program, students learn characteristics, principles, purpose, types, construction and operation of relays and solenoids. Students are introduced to a complete circuit to include all components learned in earlier lessons. They trace signals, voltage, and current through an operational circuit and troubleshoot the circuit to identify faulted components. They identify typical faults and troubleshooting procedures of relays and solenoids. Building on this knowledge, students must recognize a faulted circuit and identify the faulty component. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program
NIDA Text Manual for AC Circuits
AFIS-EFC-4 Electronics Formula Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (CAI, EW) 2:8 (CAI/PE)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 3
BASIC SOLID STATE FUNDAMENTALS AND SPECIAL COMPONENTS

TPFN: AFIS-EFC-003-003-

UNIT TITLE: Diodes

TPFN HOURS AND TYPE: 10.25 CAI; 9 CAI/PE; .75 EW

TPFN TOTAL HOURS: 20

PREREQUISITE TPFN: AFIS-EFC-003-002-

TASK(s):

- 001 Identify solid state diodes operating principles.
- 002 Troubleshoot a basic diode circuit.
- 003 Identify the characteristics and functions of clippers (limiters).
- 004 Identify characteristics and principles of a diode clamper.
- 005 Troubleshoot a faulty diode clipper circuit.
- 006 Troubleshoot a faulty diode clamper circuit.

SUMMARY OF INSTRUCTION: Using the NIDA CAI program, students identify statements concerning characteristics and principles of solid state diodes. They identify the purpose, types, schematic symbols, reference designators, construction and uses of diodes. Students must troubleshoot a basic circuit, identifying an open, shorted and changed value junction diode. They identify operation of diode Clippers (limiters) and Clampers, including the purpose and types of each. Students troubleshoot both diode Clippers and Clampers. They must recognize faulty circuits and observe the effects. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program
NIDA Text Manual for Analog Circuits
AFIS-EFC-4 Electronics Formula Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (CAI, EW) 2:8 (CAI/PE)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 3
BASIC SOLID STATE FUNDAMENTALS AND SPECIAL COMPONENTS

TPFN: AFIS-EFC-003-004-

UNIT TITLE: Transistors

TPFN HOURS AND TYPE: 3.75 CAI; .25 EW

TPFN TOTAL HOURS: 4

PREREQUISITE TPFN: AFIS-EFC-003-003-

TASK(s): 001 Identify characteristics and principles of a transistor circuit.

SUMMARY OF INSTRUCTION: Using the NIDA CAI program, students are introduced to transistor operation. Students identify the purpose, schematic symbols and types of transistors. They also identify biasing for PNP and NPN transistors and operation from cutoff to saturation. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program

NIDA Text Manual for Analog Circuits

AFIS-EFC-4 Electronics Formula Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (CAI, EW)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 3
BASIC SOLID STATE FUNDAMENTALS AND SPECIAL COMPONENTS

TPFN: AFIS-EFC-003-005-

UNIT TITLE: Power Supplies

TPFN HOURS AND TYPE: 14 CAI; 12 CAI/PE; 1 EW

TPFN TOTAL HOURS: 27

PREREQUISITE TPFN: AFIS-EFC-003-004-

TASK(s):

- 001 Identify operational characteristics and functions of power supplies.
- 002 Troubleshoot a faulty power supply.
- 003 Identify power supply voltage regulator operation principles.
- 004 Identify zener diode operating principles.
- 005 Troubleshoot a faulty voltage regulator.
- 006 Troubleshoot a faulty zener diode regulator.
- 007 Identify power supply rectifier operating principles.
- 008 Identify power supply filter operating principles

SUMMARY OF INSTRUCTION: Using the NIDA CAI program, students are introduced to power supplies, rectifiers, filters, and voltage regulators to include purpose, schematic symbols and reference designations. Students calculate values for full wave, half wave and bridge rectifiers. They identify operational characteristics of zener diode, variable resistor and IC voltage regulators. They identify power supply and voltage regulator faults, troubleshooting procedures, and then perform troubleshooting experiments. This unit concludes with a thirty-minute progress check, which students must pass with a minimum score of 72 percent before beginning the next unit. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program
NIDA Text Manual for Analog Circuits
AFIS-EFC-4 Electronics Formula Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (CAI, EW) 2:8 (CAI/PE)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 4
BASIC TRANSISTOR AMPLIFIERS AND OPERATIONAL AMPLIFIERS/CIRCUITS

TPFN: AFIS-EFC-004-001-

UNIT TITLE: Transistor Amplifier

TPFN HOURS AND TYPE: 5.75 CAI; 7 CAI/PE; .25 EW

TPFN TOTAL HOURS: 13

PREREQUISITE TPFN: AFIS-EFC-003-

TASK(s): 001 Identify characteristics and principles of basic transistor amplifier circuits.
002 Perform an operational check of a basic transistor amplifier circuit.

SUMMARY OF INSTRUCTION: Using the NIDA CAI program, students review transistor operation and are introduced to transistor amplifiers. Students identify purpose and classes of amplifiers, specifically common emitter, common collector, and common base amplifier configurations. They perform operational checks of these amplifiers including observing waveforms. This unit concludes with a thirty-minute progress check, which students must pass with a minimum score of 72 percent before beginning the next unit. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program

NIDA Text Manual for Analog Circuits

AFIS-EFC-4 Electronics Formula Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (CAI; EW) 2:8 (CAI/PE)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 4
BASIC TRANSISTOR AMPLIFIERS AND OPERATIONAL AMPLIFIERS/CIRCUITS

TPFN: AFIS-EFC-004-002-

UNIT TITLE: Multi-stage Amplifiers

TPFN HOURS AND TYPE: 5.5 CAI; 7 CAI/PE; .5 EW

TPFN TOTAL HOURS: 13

PREREQUISITE TPFN: AFIS-EFC-004-001-

TASK(s):

- 001 Identify the characteristics and principles of multi-stage transistor amplifiers.
- 002 Troubleshoot a multi-stage transistor amplifier circuit.
- 003 Identify statements concerning the characteristics and principles of special purpose devices.
- 004 Troubleshoot a circuit containing a special purpose device.

SUMMARY OF INSTRUCTION: Using the NIDA CAI program, students identify statements concerning characteristics and principles of multi-stage, RC coupled, and push-pull transistor amplifiers. Students identify purpose, operating characteristics, and functions of the amplifiers. Students then perform a troubleshooting experiment in which they must recognize faulted amplifiers and observe the effects. They identify basic facts and principles of special purpose devices, field effect transistors (FET), recognize schematic symbols and operating characteristics of each. Students then troubleshoot a circuit containing a special purpose device and identify the faulted component. This unit concludes with a thirty-minute progress check, which students must pass with a minimum score of 72 percent before beginning the next unit. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program

NIDA Text Manual for Analog Circuits

AFIS-EFC-4 Electronics Formula Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (CAI, EW) 2:8 (CAI/PE)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 4
BASIC TRANSISTOR AMPLIFIERS AND OPERATIONAL AMPLIFIERS/CIRCUITS

TPFN: AFIS-EFC-004-003-

UNIT TITLE: Operational Amplifier

TPFN HOURS AND TYPE: 4.25 CAI; 4.5 CAI/PE; .25 EW

TPFN TOTAL HOURS: 9

PREREQUISITE TPFN: AFIS-EFC-004-002-

TASK(s): 001 Identify statements concerning the characteristics and principles of an operational amplifier.
002 Troubleshoot an operational amplifier circuit.

SUMMARY OF INSTRUCTION: Using the NIDA CAI program, students are introduced to operational amplifiers. They identify the types of circuits, basic construction, purpose and calculate output values of operational amplifier circuits. Students identify typical faults found in operational amplifier circuits, troubleshooting procedures used to correct them, and then participate in troubleshooting experiments. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program

NIDA Text Manual for Analog Circuits

AFIS-EFC-4 Electronics Formula Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (CAI, EW) 2:8 (CAI/PE)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 5
ADVANCED SOLID STATE FUNDAMENTALS

TPFN: AFIS-EFC-005-001-

UNIT TITLE: Transistor Oscillators

TPFN HOURS AND TYPE: 8 CAI; 8 CAI/PE; .25 EW

TPFN TOTAL HOURS: 16.25

PREREQUISITE TPFN: AFIS-EFC-004-

TASK(s): 001 Identify the characteristics and principles of oscillators.
002 Troubleshoot an oscillator circuit.

SUMMARY OF INSTRUCTION: Using the NIDA CAI program, students identify characteristics and principles of sine wave, colpitts, hartley, RC phase, sawtooth, blocking, and non-sine oscillators. Each oscillator is described in terms of purpose, operating characteristics, and components. Students measure input and output waveforms of these oscillators. After reviewing troubleshooting procedures for identifying faulted components, students troubleshoot an oscillator circuit. This unit concludes with a thirty-minute progress check, which students must pass with a minimum score of 72 percent before beginning the next unit. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program

NIDA Text Manual for Analog Circuits

AFIS-EFC-4 Electronics Formula Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (CAI, EW) 2:8 (CAI/PE)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 5
ADVANCED SOLID STATE FUNDAMENTALS

TPFN: AFIS-EFC-005-002-

UNIT TITLE: Multi-vibrator Circuits

TPFN HOURS AND TYPE: 8 CAI; 8 CAI/PE; .25 EW

TPFN TOTAL HOURS: 16.25

PREREQUISITE TPFN: AFIS-EFC-005-001-

TASK(s): 001 Identify the characteristics and principles of multi-vibrator circuits.
002 Troubleshoot a multi-vibrator circuit.

SUMMARY OF INSTRUCTION: Using the NIDA CAI program, students identify characteristics and principles of multi-vibrator circuits, including Astable, Monostable, and Bistable. Each multi-vibrator circuit is described in terms of purpose, operating characteristics, and components. Students must measure input and output waveforms of these circuits. Students identify characteristics, principles, purpose and operation of a Schmitt Trigger circuit. After reviewing troubleshooting procedures for identifying faulted components, students troubleshoot a multi-vibrator circuit. This unit concludes with a thirty-minute progress check, which students must pass with a minimum score of 72 percent before beginning the next unit. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program

NIDA Text Manual for Analog Circuits

AFIS-EFC-4 Electronics Formula Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (CAI, EW) 2:8 (CAI/PE)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 5
ADVANCED SOLID STATE FUNDAMENTALS

TPFN: AFIS-EFC-005-003-

UNIT TITLE: Trigger Devices

TPFN HOURS AND TYPE: 4 CAI; 5 CAI/PE; .5 EW

TPFN TOTAL HOURS: 9.5

PREREQUISITE TPFN: AFIS-EFC-005-002-

TASK(s): 001 Identify the characteristics and principles of trigger device circuits.
002 Troubleshoot a trigger device circuit.

SUMMARY OF INSTRUCTION: Using the NIDA CAI program, students identify characteristics and principles of trigger devices including Unijunction Transistors (UJT) and Silicon Controlled Rectifiers (SCR). Each trigger device is described in terms of purpose, schematic symbols, operating characteristics, and components. Students measure the waveforms in the UJT, including gate and anode current in SCR. After reviewing troubleshooting procedures for identifying faulted components, students troubleshoot Silicon Controlled Rectifier trigger and power control circuits. Students review characteristics and principles of electrostatic discharge and identify methods to control and protect equipment. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program
NIDA Text Manual for Analog Circuits
AFIS-EFC-4 Electronics Formula Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (CAI, EW) 2:8 (CAI/PE)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 6
BASIC DIGITAL PRINCIPLES

TPFN: AFIS-EFC-006-001-

UNIT TITLE: Digital Electronics

TPFN HOURS AND TYPE: : 5.75 CAI; .25 EW

TPFN TOTAL HOURS: 6

PREREQUISITE TPFN: AFIS-EFC-005-

TASK:

- 001 Identify the characteristics and principles of digital circuits.
- 002 Identify principles of electrostatic discharge control to protect components and circuits.

SUMMARY OF INSTRUCTION: Using the NIDA CAI program, students are introduced to digital electronics. Areas covered include the development of digital electronics, growth of computer equipment and use of digital electronics. Students identify input and output conditions for digital circuits, identify NOT / AND / OR functions, recognizes digital truth tables and NOT / AND / OR Boolean symbols. Students review digital electronic hardware, define, identify three forms of packaging and identify markings associated with integrated circuits. This unit concludes with a thirty-minute progress check, which students must pass with a minimum score of 72 percent before beginning the next unit. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program
NIDA Text Manual for Digital Circuits
AFIS-EFC-4 Electronics Formula Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (CAI, EW)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 6
BASIC DIGITAL PRINCIPLES

TPFN: AFIS-EFC-006-002-

UNIT TITLE: Logic Functions

TPFN HOURS AND TYPE: 1.75 CAI; 6 CAI/PE; .25 EW

TPFN TOTAL HOURS: 8

PREREQUISITE TPFN: AFIS-EFC-006-001-

TASK(s): 001 Identify the basic facts and principles of logic gates.
002 Use a logic probe to analyze a logic circuit.
003 Troubleshoot a logic circuit.

SUMMARY OF INSTRUCTION: Using the NIDA CAI program, students identify basic facts and principles of logic gates. Students identify operation, logic symbols, and logic schematic representation of NAND, NOR, XOR, and XNOR gates in circuit operation. They are introduced to logic probes and its use to analyze logic circuits. Students then troubleshoot a logic circuit and predict the circuit logic state. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program

NIDA Text Manual for Digital Circuits

AFIS-EFC-4 Electronics Formula Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (CAI, EW) 2:8 (CAI/PE)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 6
BASIC DIGITAL PRINCIPLES

TPFN: AFIS-EFC-006-003-

UNIT TITLE: Combinational Circuits

TPFN HOURS AND TYPE: 4.75 CAI; .25 EW

TPFN TOTAL HOURS: 5

PREREQUISITE TPFN: AFIS-EFC-006-002-

TASK(s):

- 001 Identify the characteristics and principles of combinational logic circuits.
- 002 Convert the values in one number system to the equivalent value in another.
- 003 Convert values in number systems to and from binary.
- 004 Convert values in number systems to and from octal.
- 005 Convert values in number systems to and from hexadecimal.
- 006 Perform math operations using binary.
- 007 Perform math operations using octal.
- 008 Perform math operations using hexadecimal.
- 009 Convert values in number systems to and from binary coded decimal.

SUMMARY OF INSTRUCTION: Using the NIDA CAI program, students identify statements concerning combinational logic circuits, including the definition of combinational logic and universal logic gates. Students describe logic families, including TTL, CMOS, EL, and IIL logic. Number systems are reviewed. Students must recognize decimal, binary, octal, hexadecimal, and binary coded decimal systems; convert numbers from one base system to another; and perform math operations within the systems. Students identify operation of base 10 to binary, binary to seven-segment and 4 bit comparator circuits. This unit concludes with a thirty-minute progress check, which students must pass with a minimum score of 72 percent before beginning the next unit. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program

NIDA Text Manual for Digital Circuits

AFIS-EFC-4 Electronics Formula Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (CAI, EW)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 6
BASIC DIGITAL PRINCIPLES

TPFN: AFIS-EFC-006-004-

UNIT TITLE: Flip-Flop Circuits

TPFN HOURS AND TYPE: 14.75 CAI; 1.25 EW

TPFN TOTAL HOURS: 16

PREREQUISITE TPFN: AFIS-EFC-006-003-

TASK(s):

- 001 Identify the basic facts and principles of flip-flop circuits.
- 002 Identify the purpose and operational characteristics of RS flip-flop circuits.
- 003 Identify the purpose and operational characteristics of JK flip-flop circuits.
- 004 Identify the purpose and operational characteristics of D-type flip-flop circuits.
- 005 Identify the purpose and operational characteristics of master-slave flip-flop circuits.

SUMMARY OF INSTRUCTION: Using the NIDA CAI program, students identify statements concerning basic flip-flop circuits and their operation. They identify RS, Clocked-RS, JK, D-type, and master-slave flip-flop circuits, including their purpose and operation. This unit concludes with a thirty-minute progress check, which students must pass with a minimum score of 72 percent before beginning the next unit. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program
NIDA Text Manual for Digital Circuits
AFIS-EFC-4 Electronics Formula Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (L, CAI)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 7
ADVANCED DIGITAL PRINCIPLES

TPFN: AFIS-EFC-007-001-

UNIT TITLE: Register Memory Circuits

TPFN HOURS AND TYPE: 8.25 CAI; .75 EW

TPFN TOTAL HOURS: 9

PREREQUISITE TPFN: AFIS-EFC-006-

- TASK(s):**
- 001 Identify the characteristics and principles of register memory circuits.
 - 002 Identify the purpose and operational characteristics of 4-bit storage register circuits.
 - 003 Identify the purpose and operational characteristics of 4-bit shift register circuits.
 - 004 Identify the purpose and operational characteristics of an 8-bit register

SUMMARY OF INSTRUCTION: Using the NIDA CAI program, students receive an introduction to register memory including 4-bit storage, 4-bit shift, and 8-bit shift register circuits. They must define data, bits, and byte; and describe serial and parallel data transfer. The purpose and description of storage and shift registers is identified. Students examine register circuits and predict outputs, measuring inputs and outputs, and identify normal circuit operations. This unit concludes with a thirty-minute progress check, which students must pass with a minimum score of 72 percent before beginning the next unit. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program

NIDA Text Manual for Digital Circuits

AFIS-EFC-4 Electronics Formula Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (CAI, EW)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 7
ADVANCED DIGITAL PRINCIPLES

TPFN: AFIS-EFC-007-002-

UNIT TITLE: Arithmetic Counting Circuits

TPFN HOURS AND TYPE: 6.25 CAI; 1.75 EW

TPFN TOTAL HOURS: 8

PREREQUISITE TPFN: AFIS-EFC-007-001-

- TASK(s):**
- 001 Identify the characteristics and principles of arithmetic counting circuits.
circuit.
 - 002 Identify statements concerning the purpose and operational characteristics of
ripple counters.
 - 003 Identify the purpose and operational characteristics of up counters.
 - 004 Identify the purpose and operational characteristic of down counters.
 - 005 Identify the purpose and operational characteristics of 4-bit adders.
 - 006 Identify the purpose and operational characteristics of 4-bit subtractors.

SUMMARY OF INSTRUCTION: Using the NIDA CAI program, students receive an introduction to arithmetic counting circuits which includes the purpose of counters, a description of how a counter divides and its use in timing circuits. Students identify purpose of adder circuits and how they are used in addition, subtraction, multiplication, and division. Students identify purpose and operational characteristics of ripple counters, up counters, down counters, 4-bit adders, and 4-bit subtractors. Students must recognize the normal operation of these counters. This unit concludes with a thirty-minute progress check, which students must pass with a minimum score of 72 percent before beginning the next unit. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program
NIDA Text Manual for Digital Circuits
AFIS-EFC-4 Electronics Formula Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (CAI, EW)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 7
ADVANCED DIGITAL PRINCIPLES

TPFN: AFIS-EFC-007-003-

UNIT TITLE: Conversion and Data Circuits

TPFN HOURS AND TYPE: 11 CAI; 1 EW

TPFN TOTAL HOURS: 12

PREREQUISITE TPFN: AFIS-EFC-007-002-

TASK(s):

- 001 Identify the characteristics and principles of conversion and data circuits.
- 002 Identify the characteristics and principles of D/A conversion circuits.
- 003 Identify the characteristics and principles of data selector circuits.
- 004 Identify the characteristics and principles of data distribution circuits.

SUMMARY OF INSTRUCTION: Using the NIDA CAI program, students receive an introduction to characteristics and principles of conversion and data circuits. This unit includes identifying the purpose of data circuits and recognizing basic A/D and D/A circuits. Students identify the characteristics and principles of D/A conversion, data selector, and data distribution circuits. Students must identify the purpose of these circuits and recognize their normal operation. This unit concludes with a thirty-minute progress check, which students must pass with a minimum score of 72 percent before beginning the next unit. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program

NIDA Text Manual for Digital Circuits

AFIS-EFC-4 Electronics Formula Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (CAI, EW)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 7
ADVANCED DIGITAL PRINCIPLES

TPFN: AFIS-EFC-007-004-

UNIT TITLE: Microprocessor Circuits

TPFN HOURS AND TYPE: 12 CAI; 1 EW

TPFN TOTAL HOURS: 13

PREREQUISITE TPFN: AFIS-EFC-007-003-

TASK(s):

- 001 Identify the purpose and operational characteristics of computers.
- 002 Identify the purpose and operational characteristics of microprocessors.
- 003 Identify types and operating principles of computer memories.
- 004 Identify computer peripheral devices and operating principles.

SUMMARY OF INSTRUCTION: Using the NIDA CAI program, students are introduced to computers, including history and advantages of modern computers. Students identify major parts, peripheral devices, and define common terms associated with computers. The characteristics and principles of microprocessors are identified, to include basic computer functions, types of computer memory, number systems used, and math computations performed. This unit concludes with a thirty-minute progress check, which students must pass with a minimum score of 72 percent before beginning the next unit. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

NIDA CAI Program
NIDA Text Manual for Digital Circuits
AFIS-EFC-4 Electronics Formula Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (CAI, EW)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 8

SOLDERING

TPFN: AFIS-EFC-008-001-

UNIT TITLE: Soldering

TPFN HOURS AND TYPE: 6 L; .5 EW; 2 D; 14.5 PE; 1 EP

TPFN TOTAL HOURS: 24

PREREQUISITE TPFN: AFIS-EFC-007-

TASK(s): 001 Identify basic facts and principles of soldering and de-soldering.
002 Solder and de-solder wires and components on a printed circuit board.
003 Assemble solderless connectors.

SUMMARY OF INSTRUCTION: Using the NIDA CAI program and lecture, students identify basic facts and principles of soldering and de-soldering. Students identify tools, equipment, and materials used in this process. Cleanliness and safety are emphasized. Preparation steps are explained and demonstrated for both soldering and de-soldering procedures. Students then participate in practical exercises where wires and components are soldered and de-soldered on printed circuit boards. Preparation steps are explained and demonstrated for both solder and solderless connectors. Students participate in practical exercises where they assemble solder and solderless connectors. Students knowledge will be evaluated by answering a minimum of 70% correctly on written exams (EW).

REFERENCES:

TM 43-0158 / TO 00-25-234, General Shop Practices
TM 55-1500-323-24 / TO 1-1A-14, Aircraft Electric and Electronic Wiring
AFIS-EFC-11 Soldering and Solderless Connectors Handout

INSTRUCTOR/STUDENT RATIO: 1:8 (L, EWI) 2:8 (D, PE, EP)

SAFETY FACTORS: Students must follow all safety precautions that pertain to electrical shock, electrical burns, electrical fires, and misuse of tools and equipment.

FUNCTIONAL AREA 9
COURSE ADMINISTRATION

TPFN: AFIS-EFC-009-001-

UNIT TITLE: Course Administration Activities

TPFN HOURS AND TYPE: 1.5 AD

TPFN TOTAL HOURS: 1.5

PREREQUISITE TPFN: None

TASK(s): 001 Inprocessing.
 002 Course critique.
 003 Outprocessing.
 004 Graduation.

SUMMARY OF ACTIVITIES: Self-explanatory.

REFERENCES:

DINFOS Policy and Operating Procedures Manual (POPMAN)

INSTRUCTOR/STUDENT RATIO: 1:8 (AD)

SAFETY FACTORS: Normal